Working Group 6
RTCA DO-242A ADS-B MASPS
Minutes of 12th Meeting held in Arlington VA.
February 18 - 22, 2002

The attendees included:

Tom Foster, Rockwell Collins	Jonathan Hammer, Mitre/CAASD	Robert Manning, AF/XOR-GANS
Stuart Searight, FAA / ACT-350	Ron Jones, FAA / ASD-140	James Maynard, UPS AT
Jerry Anderson, AIR-130	Stan Jones, Mitre/CAASD	Ken Staub, Trios Assoc.
Richard Barhydt, NASA Langley	George Ligler, PMEI	Tony Warren, Boeing Air Traffic Mgmt.
Bill Flathers, AOPA	Gary Livack, FAA / AFS-400	

Monday, 18 February

1. Introductory Remarks

   - Tom Foster convened the meeting by welcoming everyone to the Rockwell offices. Opening remarks were kept short as everyone acknowledged the busy week ahead.

2. Review Agenda

   - The agenda was approved without comment.

3. Review and Approve Minutes of Last Meeting

   - Stuart reported on the modifications he made to the minutes per feedback via email from Tony Warren.
   - Robert Manning pointed out two typos
   - The minutes were then approved without further comment.

4. The group reviewed Section 1 with Tom's updates after his consistency review. After some minor edits, this material was accepted as ready for DO-242A.

5. The group reviewed those parts of Section 2 not specifically addressing intent. This included Tom's updates after his consistency review, and 242A-WP-12-01B up to 2.1.2.18 "Intent Information". After some minor edits, this material was accepted as ready for DO-242A.

6. The group began its review of Section 3 with the updated parts of the section from Stuart's consistency check. Some edits were made as the review progressed.

Tuesday, February 19

6. (continued) Section 3 review

   - The material provided by WG5 from the TLAT report for LA2020 was reviewed and accepted as a replacement for the existing 3.3.4 "ADS-B Network Capacity" section.

   - It was agreed that all of Section 3.5 and 3.6 could use a major rewrite and that some of this material will need to be migrated into the ASA MASPS in the future. However, due to time constraints, for Rev A, the only changes to be made will be the deletion of a few subparagraphs,

and the removal of all uses of "shall" except for the two places in which it was determined hard requirements should exist.

- After editing 3.5 and 3.6, this section 3 material was accepted for DO-242A inclusion.

7. The group reviewed two new Issue Papers from Tom Mosher:

- IP61, "Need Guidance on coping with duplicate A/V addresses" – It was agreed that this IP had to be deferred since it came so late and that it potentially could be objectionable to Mode S users.

- IP62, "Delete note regarding transponder codes in A/V address requirements" – After some discussion of the topic, the note in question will be reworded, but not deleted.

8. A request by WG5 to relax the update requirements on either barometric or geometric altitude when both are being broadcast was discussed. WG5 felt that when both altitudes are being broadcast, they should not both be required at SV update rates. While initially WG6 felt this was a reasonable request, further examination of this issue left some unanswered questions.

- Validation would be needed to determine exactly what the lower rate of the "secondary" attitude could be.
- Under certain circumstances geometric altitude will need to be required as the "primary" altitude, and under other circumstances barometric altitude will need to be required as the "primary" altitude.

While it was believed by WG6 that these requirements could be developed without a major effort, time constraints on the completion of revision A forced the deferral of developing these requirements. However,, a note was added to Table 3.4.3 "State Vector Report Definition" explaining that this relaxation is a likely occurrence in a future revision of the MASPS. Also, an Issue Paper will be created documenting this topic.

Wednesday, February 20

9. Jonathan Hammer reported on the recent Working Group 4 meeting held in Brussels. While the entire WG4 did not review the resolutions and LSBs of the report elements, Jonathan examined them himself and provided his feedback to the group. Jonathan's feedback was discussed and incorporated into 242A-WP-12-01.

10. George Ligler, Stan Jones, and Ron Jones joined the group for a discussion on how to best handle the updating of changes in the values of time-critical elements of the Mode Status and Trajectory Change reports.

- Jerry Anderson and Tony Warren both expressed concern that there is no explicit update requirement for Mode Status reports.

  ➢ A by-product of this topic was the creation of new text discussing the "other 5%" of the user population that does not meet the 95% acquisition requirement for SV, MS, and on-condition reports. This new text was needed to clarify that the vast majority of the other 5% not acquired at the specified range will be acquired soon thereafter.

- After some discussion, it was proposed to create a new on-condition report that would be used to convey the change in value of these time-critical elements. This report was named the Status Change (SC) report.

- While the SC report format and conditions for triggering the broadcast of messages supporting the SC report will be defined, broadcast rates and duration will not be defined on DO-242A.

- After reviewing the MS and TC elements it was decided that the air-ground fields in MS ("Emergency/Priority Status" and "IDENT Switch Active") would not be included in the SC report. Instead, a note was added to the MS table saying rapid updates of these fields is probably achieved by ground stations having better reception performance, but that performance will require validation in the future and that these fields might need to be included in the SC reports in the future.

- The elements from the MS report to be included in the SC report are: TCAS Operational Capability code, TCAS currently issuing and RA Operational Mode code, NACP, NACV, and SIL.

- The elements from the TC report to be included in the SC report are: The TC Cycle Index Number and the TC Management Indicator.

Thursday, February 21

11. The group reviewed MASPS text created by Jim Maynard for the new Status Change Report. It was realized that these reports do not need to be required if a particular ADS-B system uses message transmissions to update these fields directly in either the MS or TC reports. Appropriate changes were made in the proposed text.

12. The group reviewed the all of the MASPS language for short- and long-term intent in section 2. Jim Maynard proposed text that was a combination of his and Richard's work in this area. After review and some minor editing, this material was accepted.

13. The group then moved to the intent material in Section 3. This material is the definitions and requirements for the Target State (TS) and Trajectory Change (TC) reports.

    - There was much debate about what level of report management needed to be specified since only TC+0 reports are being addressed in DO-242A.
    - Tony felt the TCMI field was needed with 3 values (retain and refresh, sequence, and mark as invalid). Stuart and Jim felt there was not a need for the resequence value since DO-242A will not deal with continuity of TC reports.

Friday, February 22

12. (Continued) Tony presented some new text for the TC report management and the TC Management Indicator field. After some debate, it was agreed that Stuart would try to rework this material and it would be discussed the following week during a telecon. This re-write will include a new section specifically for TC report management. Having this new section will separate (and thereby hopefully clarify) the requirements for when the Cycle Number and TCMI fields will hold particular values from the report management actions to be taken dependant of the values of those fields.

14. The group began to review some of the appendices, including D & E.

15. The group discussed what still needed to be done before the draft MASPS was submitted to RTCA. It was agreed that Appendices N, O, and Q would be completed by COB March 6, reviewed by the group, and submitted to RTCA one week after the rest of the document. Also, section 4 would need

to be completed after all of the "shall"'s were numbered. Section 4 will also need to be delivered to RTCA one week late.

16. A series of telecons were scheduled for the following two weeks for the purposes of reviewing the final MASPS languages on intent and the appendices.

- Tuesday, 2/26, 11:00AM EST   DO-242A body (primarily intent)
- Wednesday, 2/27, 11:00AM EST   Appendices D, E, F, G, and H
- Friday, 3/1, 11:00AM EST   Appendices A, B, and C
- Friday, 3/8, 11:00AM EST   Appendices N, O, and Q

17. Review of Action Item Status [et al]

- No new action items were officially given at this meeting. The actions needed for completion of the document were reviewed, and everyone confirmed they were aware of what they had to do.

    ➢ Appendices N, O, and Q are to be completed by COB Wednesday, March 6. They will be distributed for review so that they can be discussed on the 3/8 telecon.

- The action items from the previous meetings were reviewed to see what was outstanding, and if any open action items directly affected the completion of DO-242A.

18. Review Date and Place of Next Meetings [et al]

Current schedule for Working Group 6 meetings:

April 8-9&12	RTCA, Washington DC
	9:00am Monday thru 5:00pm Tuesday
April 10-11	SC-186 Plenary: RTCA, Washington DC
May 7-9	Location, TBD*
	9:00am Tuesday thru 3:00pm Thursday

tentative meeting locations

19. Action Items
- See Table on following pages.

Action Number	Action Item Description	Assigned to	Status
11-1	Write Appendix N with justification and background information on intent requirements and to include current best proposals for TCR+1 update requirements. This appendix will be based largely on the revised Intent White Paper.	Tony Warren Richard Barhydt	Due 3/6
11-2	Write Appendix O to fully describe the scenarios on which the intent update requirements are based.	Tony Warren Stan Jones	Due 3/6
11-3	Write a non-normative Appendix "Q" on OC-ARV and possible future conditions that will require its transmission.	Richard Barhydt	Due 3/6
11-4	Review Appendix L and determine what changes are needed as a result of the new intent requirements.	Stan Jones	
11-5	Incorporate agreements on how to represent Intent requirements originally proposed in section 3.3.3 and represent them in text form with summarization in tables. Distribute prior to February WG6 meeting.	Stuart Searight	Completed (242A-WP-12-01)
11-6	Author an Issue Paper on the request, need, and justification for the "New Note 7."	Steve Heppe	Completed (IP58)
11-7	Author an Issue Paper requesting that NAC_V only have values [0..3], for consistency with resolution requirements and reducing NAC_V to a 2-bit field.	Steve Heppe	Completed (IP57)
11-8	Verify the proper phraseology is used for obstacle categories (point, cluster, and line) is used in 2.1.2.4 of 242A-WP-11-01A.	Ken Staub	Closed
11-9	Provide text for 2.1.2.10.2 "TCR Cycle Number" and 2.1.2.10.3 "Reserved for TCR Transition Flag" subparagraphs	Tony Warren	Completed (242A-WP-12-01)
11-10	Author an Issue Paper on the apparent error in Note 3 of Table 3-4(a) and Appendix H, and send that Issue Paper to Stan Jones and Jonathan Hammer for review.	Tony Warren	Completed (IP60)
10-1	Write a formal Issue paper for the IDENT request provided by Capstone and propose MASPS language for this capability.	Ken Staub	Completed (IP52)
10-2	Author Issue Paper requesting ADS-B capability to transmit code which distinguishes whether or not the flight is under ATC control (analogous to squawking 1200).	Bill Flathers	Completed (IP53)
10-3	Supply text for remaining TBDs for TSR and TCR requirements to Jim Maynard for incorporation into 242A-WP-11-01.	Richard Barhydt	Completed (01/24/02)
10-4	Incorporate material from 242A-WP-10-10 into next draft of the SV, MS, and OC Report Reorganization paper (242A-WP-11-01)	Jim Maynard	Completed (242A-WP-11-01)
10-5	Facilitate another round of discussion on Note 7 of Table 3-4 (IP35) with Stan Jones, Jonathan Hammer, Steve Heppe and Bill Harman and set up a telecon for the 3rd week in January with the goal of bringing this to closure.	Stuart Searight	Completed (242A-WP-11-08)
10-6	Request Stan Jones to author an Issue Paper on user population requirement proposal in 242A-WP-10-05.	Stuart Searight	Done (IP55)
10-7	Write an Issue Paper on the request from Capstone for the ability to stop transmitting altitude upon request for situations when pressure altitude is.	Jim Maynard	Completed (IP54)
10-8	Write an Issue Paper on the request from Capstone for ability to switch to "no squawk" or receive only mode. (The 1090 requirement for "Stand-by Mode" in section 4.4.6 of DO-260. will be sighted.)	Jim Maynard	

Action Number	Action Item Description	Assigned to	Status
10-9	Incorporate obstacle definitions into MASPS glossary upon receiving the Airport Mapping document from Rudy Riana at RTCA.	Stuart Searight	OBE (No definitions in provided document)
9-1	Edit letter to SC-181 (242A-WP-9-08) and draft letter to SC-159 regarded availability of integrity and accuracy components for PVT data.	Tom Foster	Completed
9-2	Provide definitions on navigation reference point for inclusion in Appendix B	Ken Staub	Completed (post-distribution)
9-3	Develop and appendix from 242A-WP-5-04 to justify aircraft size coding requirements being added to DO-242A	Ken Staub	Completed (242A-WP-11-11)
9-4	Develop definitions for determining on-ground and airborne status from the perspective of when ADS-B systems need to transmit specific data similar to the approach taken in DO-260.	Jim Maynard	Completed (242A-WP-11-01)
9-8	Write an Issue Paper regarding the analysis needed to address the accuracy and latency requirements for altitude rate in a future MASPS revision.	Tom Foster	
9-10	Author an Issue Paper stating the need to have the ASA MASPS service levels carried into the ADS-B MASPS.	Jonathan Hammer	
9-11	Review the WG6 minutes and provide a list of "Coordination Issues" identified between WG6 and WG4.	Stuart Searight	Completed (MASPS Resolutions.doc)
9-12	Propose refinements to 2.1.2.10 of 242A-WP-9-01a to define the conditions for when a TCR needs to be re-issued. (This criteria will not just be a change in the TCP sequence as written in 242A-WP-9-01, but will also be set for "major" changes in the data set, which Tony will define. These changes will be reflected in the White Paper as well so that they are consistent.)	Tony Warren	Completed (242A-WP-12-01)
9-15	Examine the most demanding application for which they currently have understanding of provide the requirements for resolution (in meters) for the state vector report of horizontal position (lat/lon) for both airborne and on-ground aircraft. (This work might start in Appendix G.) Also requested are required SVR resolutions for geometric altitude, ground speed while on the surface, and vertical rate. (See table 3.4.3.1 of 242A-WP-9-01a)	Jonathan Hammer (WG4)	Completed
9-16	Verify that 9 bits is a typo and should read 19 bits for amount of bits needed to support airborne applications in G.2.1 of Appendix G.	Jonathan Hammer	Completed (post-distribution)
9-17	Provide mathematical argument for arriving at required resolution for heading while on ground.	Jim Maynard	Completed
9-19	Write and Issue Paper questioning the need for Report Mode in the State Vector Report. (site text at bottom of page 96 of DO242) Perhaps such a field is needed to convey what is known about a target, and whether it has yet been acquired.	Stuart Searight Jim Maynard	Closed (OBE – Report to remain in DO-242A)
9-20	Write up summarization of the discussion on coasting, and element validity being based message reception requirements.	Tom Foster	
8-1	Review and comment on proposed resolutions (LSBs) for TCR elements	Jonathan Hammer (WG4)	Completed
8-6	Pull definitions for VFOM, HFOM, HPL, VPL, and EPU from GPS and/or RNP documents	Stuart Searight Jim Maynard	Completed

Action Number	Action Item Description	Assigned to	Status
7-1	Consider from an operational point of view whether a change in value which improves NIC or NAC needs to be updated at the same rate as the state vector just like a detrimental change does, or if it can be update at the lower update rate of the Mode Status report.	Jonathan Hammer (WG4)	To be added to WG4/WG6 coordination list
7-6	Incorporate into Appendix J the supporting study on altitude rate that demonstrated that geometric was the best altitude source followed by barometric, and then derived barometric.	Jonathan Hammer	Completed
7-11	Tighten the wording in the State Vector requirements, that both barometric and geometric altitude shall be reported when available, and clarify what is meant by "when available". (IP42)	Jim Maynard	Completed
7-14	Determine what changes are needed for removal of Turn Indication as a required SV element	Stuart Searight	Completed (242A-WP-11-02)
7-15	Implement proposed changes for IP 36	Stuart Searight	Completed (242A-WP-11-02)
7-17	Reword Issue Paper 19 to reflect the broader context of runway incursion alerting this paper now represents.	Gary Livack	
6-4	Search entire MASPS for instances of "NUC", "integrity", and "accuracy" to assure NIC/NAC changes are complete.	Stuart Searight	Completed
6-5	Clarify Tables 2-2 and 2-3 and all text referencing these tables. (This material is not ADS-B requirements, but is rather "anticipated application requirements".)	Stuart Searight	Completed
6-11	Clarify or change wording in proposed MASPS changes for IP05 so that anonymous addresses will be reset if duplicate addresses are detected.	Ron Jones	Closed (OBE – no specific anonymous mode procedures will be added, just Address Qualifier.)
6-18	Review the proposed revision of Table 3-5 in 242A-WP-6-11 and determine if it adequately resolves IP29 on the reporting of both geometric and barometric pressure altitude.	Steve Heppe	Closed (OBE)
5-1	Write an Issue Paper documenting the issues and concerns related to passive ranging. This Issue Paper will not be addressed in Rev A.	Jim Maynard	
5-3	Author a proposed footnote to the definition of ADS-B which talks to the link flexibility and protocol issues in response to the groups discussion on IP30.	Dan Castleberry	Closed (OBE)
5-20	Coordinate about work being done to resolve IP23 and IP32 regarding a way to map ADS-B capabilities, applications, features, and intended functions to the draft Advisory Circular on Guidelines to the Operational Approval for ADS-B Avionics.	Gary Livack Jim Maynard	Closed (OBE)
3-6	Write White Paper on backward compatibility subject	Tom Foster	Closed (242A-WP-12-04)
3-9	Write comments to IP15 explaining rationale for rejecting	Dan Castleberry	
2-16	Write ad hoc group's response to issue #3 of IP7 that will put issue in broader context and serve as proposal to WG#4 for consideration in the ASA MASPS.	Dan Castleberry	